



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: BR700-725A1-12 BYPASS RATIO (-): 4.4
 UNIQUE ID NUMBER: 01P11BR016 PRESSURE RATIO π_{co} (-): 26.2
 COMBUSTOR: Z-ring
 ENGINE TYPE: MTF RATED OUTPUT F_{oo} (kN): 75.7

REGULATORY DATA

| CHARACTERISTIC VALUES: | LTO_{mass}/F_{oo} (mg/kN) | LTO_{num}/F_{oo} (particles/kN) | NVPM MASS CONCENTRATION ($\mu\text{g}/\text{m}^3$) |
|--|--------------------------------|--------------------------------------|---|
| LTO/ F_{oo} AND MAX nvPM _{mass} | 498.8 | 6.72E+15 | 1152 |
| AS % OF CAEP/10 LIMIT | - | - | 15.0 |
| AS % OF CAEP/11 LIMIT (InP) | 16.5 | 37.0 | |
| AS % OF CAEP/11 LIMIT (NT) | 68.5 | 76.5 | |

MEASURED DATA

| MODE | POWER SETTING (% F_{oo}) | TIME minutes | FUEL FLOW kg/s | EMISSIONS INDICES* | | NVPM MASS CONCENTRATION PEAK nvPM _{mass} ($\mu\text{g}/\text{m}^3$) |
|---|--------------------------------|-----------------|-------------------|-------------------------------|-------------------------------------|--|
| | | | | EI _{mass} (mg/kg) | EI _{num} (particles/kg) | |
| TAKE-OFF | 100 | 0.7 | 0.789 | 216.7 | 1.13E+15 | |
| CLIMB OUT | 85 | 2.2 | 0.650 | 227.3 | 1.65E+15 | |
| APPROACH | 30 | 4.0 | 0.221 | 20.8 | 1.09E+15 | |
| IDLE | 7 | 26.0 | 0.085 | 22.4 | 1.34E+15 | |
| LTO TOTAL (kg, mg, number of particles) | | | 304 | 30765 | 4.15E+17 | - |
| NUMBER OF ENGINES | | | | 2 | 2 | 2 |
| NUMBER OF TESTS | | | | 3 | 3 | 3 |
| AVERAGE LTO/ F_{oo} VALUES (mg/kN, particles/kN) | | | | 406.4 | 5.48E+15 | - |
| MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$) | | | | 231.8 | 2.35E+15 | 982 |

* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

| MODE | POWER SETTING (% F_{oo}) | CORRECTED EMISSIONS INDICES | |
|-----------|--------------------------------|----------------------------------|--|
| | | EI _{mass_SL} (mg/kg) | EI _{num_SL} (particles/kg) |
| TAKE-OFF | 100 | 236.9 | 1.72E+15 |
| CLIMB OUT | 85 | 251.6 | 2.63E+15 |
| APPROACH | 30 | 26.7 | 2.58E+15 |
| IDLE | 7 | 29.7 | 3.39E+15 |

AMBIENT CONDITIONS

| | From | To | FUEL | |
|--------------------------------|--------|--------|-------------------------------|-------|
| BAROMETER (kPa) | 99.0 | 99.8 | HEAT OF COMBUSTION (MJ/kg) | 43.29 |
| TEMPERATURE (K) | 291.8 | 296.9 | HYDROGEN CONTENT (%mass) | 13.85 |
| HUMIDITY (kg water/kg dry air) | 0.0051 | 0.0077 | AROMATICS CONTENT (%vol) | 16.9 |
| | | | NAPHTHALENE CONTENT (%vol) | 0.47 |
| | | | SULPHUR CONTENT (ppm by mass) | 11 |

MANUFACTURER: Rolls-Royce Deutschland
 TEST ORGANIZATION: Rolls-Royce Deutschland
 TEST LOCATION: Dahlewitz
 TEST DATES: 12/05/2016-13/05/2016

REMARKS

1. Certification Report EDNS01000426081 Issue 4
2. The maximum EI_{mass} occurs between 30% and 85% F_{oo}
3. The maximum EI_{num} occurs between 30% and 85% F_{oo}
4. Corrected peak EI number value (fuel correction) since EEDB v30